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Evaluation of the Aquatic Ecological Aspects of the Environmental Assessment and Safety Report for Amok Ltd. Uranium Project, Cluff Lake

performed at the request of the
Cluff Lake Board of Inquiry

by

Patricia I. Tones, Ph.D.

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As requested by the Cluff Lake Board of Inquiry, this report evaluates those aspects relating to aquatic ecology of the Environmental Assessment and Safety Report for the Amok Ltd. Uranium Project Cluff Lake, Saskatchewan.

The following evaluation can be divided into two catagories: firstly, an overall assessment of the report as it relates to aquatic ecology and, secondly, a more specific assessment of Appendix G and section 3. G.2 of the report which were prepared by the Saskatchewan Research Council.

Overall Assessment of the Report

This report must be criticized because it does not assess the environmental impact of the Amok Uranium Project on the surrounding aquatic community. The report contains a baseline study describing the aquatic community as it existed in 1974-75 but the relevancy of these results to the project is not discussed adequately. Although an understanding of baseline levels is certainly a necessary first step, it must be followed by a realistic discussion of (i) possible impact of the project on the aquatic ecosystems, (ii) methods of monitoring the impact and (iii) possible mitigative measures. These statements should be present in Section 4 of the report entitled "Environmental impact of the proposed action and mitigative measures" but they are not.

Subsection D of Section 4, entitled "Ecological effects" emphasizes terrestrial effects and is very superficial. For example, there is no discussion of possible accumulation of wastes in parts of the aquatic ecosystem or in the lake sediments. Many substances may be accumulated in the sediments or by plants and animals even though

water samples contain minimal amounts. If there was accidental contamination where would it become concentrated?

The second major criticism applies to the choice of lakes which were studied in detail. The centreline of the proposed main tailings dam is located 500 feet northwest of Snake Lake(1) which then drains southwesterly into Island Lake. The proposed tailings area is located west of the plant site while Cluff Lake and Carswell Lake are to the east and northeast of the plant site. It appears that Appendix G contains a base line study of the wrong lakes! At least, it should have been expanded to include the Snake Lake and Island Lake drainage in more detail.

Water samples were taken from Island Lake near the end of the sampling program (May, 1975) and analyzed but the biological survey only included Cluff Lake and Carswell Lake. Analyses for uranium, radium, and polonium were carried out on fish samples from Cluff Lake only. There are no biological base-line data for Snake Lake and Island Lake.

Appendix G of the report was presented to Stearns-Roger Inc. in August 1975 by the Saskatchewan Research Council. Apparently the decision to locate the tailings disposal site upstream of Snake Lake was contained in a report entitled "Conceptual Design for Tailings Disposal System" dated September 1975 after the environmental field work was completed.

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(1) Kilborn Engineering Ltd. 1977. Amok Ltd. Report on Tailings Disposal System.

Specific Assessment of Appendix G and Section 3. G.2.

Taking into consideration the problems associated with ecological assessments in remote northern areas, the base-line study met the study objectives. Specific aspects of the study should be criticized however.

The choice of study objectives is particularly unimaginative. With the exception of the radio-chemical analyses, this study is a conventional lake study oriented towards fisheries management superimposed on Cluff Lake and Carswell Lake. The results could have been far more useful if the study had been designed to answer the most important questions. For example, possible contamination of the Douglas River system is of prime importance because of the possible far-reaching effects downstream. Ecological data on this river would have been useful but it was virtually ignored in the biological sampling program. Time spent at Carswell Lake could have been better spent at Douglas River. As a second example, the objectives state that benthic fauna were to be carefully analyzed (i.e. identified and counted) from at least 60 grab samples on Cluff Lake. Not a single benthic organism was included in the radio-chemical analyses even though some of the highest levels of uranium were found in the lake sediments.

Biological field data was collected for only one year from mid July 1974 to early June 1975. Aquatic communities are cyclic, changing noticeably with the season, so that the July samples would not be expected to be the same as the June samples. A program which had two full summer field seasons would yield data for the same dates on two consecutive years. Such a program would be much more reliable

because the data for one year could be compared with that from the following year. Because this wasn't done, there is no way to know whether the results are "typical" or whether the populations were unusually high or low during the year studied. An additional two months of field work and more frequent samples would have improved the results considerably.

There is no detailed discussion of the impact of an all weather road and a greater human population causing increased recreational demand and affecting fisheries management in the area.

The subsection H on radioactivity levels potentially contains the most important baseline data. Due to the variability of the results shown in the report it is particularly important to determine the accuracy and precision of the method, and analyze sufficient replicates so that the results can be stated with confidence. If the results are not statistically valid they are of limited use as a baseline. This is particularly true if they are to be used many years hence to show a significant difference. For example, one Northern Pike from Cumberland Lake was used as a control. Was this pike "typical" of the Cumberland Lake population with respect to radionuclides or was the level in this fish unusually high? To be useful, a sufficiently large sample of the Cumberland Lake population should be compared with a similar sample from the Cluff Lake population.

Conclusions

1. A biological baseline study of the Snake Lake - Island Lake drainage is necessary. This study will provide a reference

point for monitoring and for early detection of undesirable changes if the project goes ahead.

2. A baseline study is only the first part of an adequate environmental assessment. The Saskatchewan Research Council states in the Study Objectives, Appendix G, that it has assumed the responsibility for making a baseline assessment of the environment of Cluff Lake and the surrounding area. It seems that either (i) the terms of reference used by the Saskatchewan Research Council were too narrow or (ii) the subsequent impact statement by Stearns-Roger Inc. is incomplete.

3. The section "Radioactivity Levels" is probably one of the most important sections and one of the most poorly done with respect to the biological samples. It should be expanded and put on a sound statistical basis.

4. Possible contamination of the Douglas River system is of great importance and careful monitoring of the river system should be required.

Boreal Institute
For Northern Studies

January 23, 1979

Mrs. S.G. Bellamy
Supervisor, Records, Postal and
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5th Floor, 1855 Victoria Ave.
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Dear Mrs. Bellamy:

Re: Cluff Lake Board of Inquiry Exhibits.

The exhibit copy requested was CLB-110-N: Evaluation of the Aquatic ecological aspects of the environmental assessment and safety report, by P.I. Tones.

Any information made available to myself and the Boreal Institute Library is appreciated. I would also like to take this opportunity to thank you and the other staff members who helped me during my visit to your library.

Sincerely yours,

K Bodden

Ken Bodden
Research Associate
Boreal Institute for Northern Studies

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